The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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Control and the Trader

FOR the purpose of winning the war the Government is pursuing a steady course and little by little is bringing the whole of our trade under control. Criticism appears to leave the process unaffected. Such obvious and immediate failures as the attempt to organise the distribution of fish or the sale and blending of tea have left the controllers unaffected, and within the week we hear of the processes of rationing as applied to meat and to paper. If this goes on, there will be very little left to the discretion of the private trader.

Those who remember the ups and downs we had to suffer after the 1914-18 war because of the absence of a well-conceived financial policy will have no quarrel with Sir John Simon in his attempts to save us from that sort of thing in the future. In the ideal state every individual could be trusted to cut his consumption down to minimum and to apply the money so saved to the prosecution of the war. But we are not in the ideal state. Personal interests, more often than not personal pressing needs, make it difficult for the individual by himself to act in the ideal way. That being so, the state is forced to take such steps as will help him to behave in the only way that will save the nation from disaster. Rationing and control have that effect, whatever may be their faults—and they are many. These things do limit consumption and thus effect the main purpose of the Chancellor.

So far we can all agree. Even the harassed shopkeeper who finds his trade restricted to a point very near to ruin is not prepared to grumble. He is as concerned as any other citizen with the winning of the war. His whole interests are bound up in that objective, and so long as these penalties put upon him are connected with that purpose and have no other purpose behind them, he would be the last to indulge in any movement to harass the Government or weaken the national effort. But unfortunately it is not possible to feel with any confidence that the only motive behind many of these trials and tribulations is the motive of winning the war. The existence of a large class of Civil Servants who imagine that they could run the business of the country better than the traders is not in dispute. They are making the most of the opportunity thus presented to them, and a steady flow of official speeches and announcements shows how their ideas have been woven into the present national interests. There is, for instance, the old and wholly fallacious notion that we have too many shops. A favourite argument of one political school is the extravagance of two milkmen going down the same road side by side. They pretend that economy and efficiency would be promoted by setting up an arrangement under which one milkman had the monopoly. The argument is, of course, wholly fallacious, but it can be seen between the lines of most of the official information on this question of rationing.

The retailer is debarred for the period of the war from raising controversial questions. We have all agreed to bury our differences and forget that there are various political points of view. The trade associations of the country are loyally abiding by the terms of this truce. Their opponents have not the same scruples. A leading article in *The Times* a few days ago, explaining Sir John Simon's efforts to keep the price level steady, said: "It is a standing grievance of the producer that, when the various middlemen have taken their shares, he only receives a small fraction of what the consumer is called upon to pay." We confess to no little surprise that *The Times* should allow itself to be made the medium for this dangerous rubbish in the middle of a war. The middleman is the greatest force known to economic science for economy.

The last fifty years have shown attempts from every side to economise on the old-fashioned system of merchant, wholesaler and retailer, but the price record shows that while such devices have greatly expanded the facilities of distribution and have made the task of the buyer or consumer to that extent easier, they have done nothing whatever to reduce prices. It will be necessary at the proper time to get back to some of the old orthodox economic truths and re-state the old arguments. The value to the consumer, the economic needs of competition and multiplicity of sources of supply will have once again to be defended. So far as the merchant and the wholesaler are concerned, the same battle will have to waged over again. The erroneous theory that speculation is an addition to cost will once again need to be exposed. History is quite clear on the matter. Speculation in any market has never done anything but bring prices down.

Finally we foresee the need for national education on the question of profits, for the same untruth has sunk into the public ignorance, and it is very widely believed that profit is an addition to cost, though the truth is that profit is a commission on economy. The duty of the tradesman is first of all to obey the law, secondly to keep up such a stream of criticism as shall tend to modify the activities of the bureaucracy, and lastly to reserve his strength for the time, not too far distant, when he will have once again to justify his position to the public at large.

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NOTES AND COMMENTS

Export Trade

THE Prime Minister's refusal to have in the War Cabinet a Minister responsible for trade and industry and for the nation's economic policy otherwise than from financial aspects was held to be a matter for regret at the annual meeting of the Manchester Chamber of Commerce last Tuesday. Mr. Francis Grundy, addressing the Chamber as its President, declared that the business world would have preferred to have such a Minister appointed. They were told, he said, that it was a seller's market to-day in the world at large, and that it was only a question how much of our industrial production could be spared for export. Such conditions, however, would help our competitors more than ourselves if our arrangements were not wisely made. In several trades and markets we should be making intensive organised efforts, where, in fact, trade was in low water. These exports were needed either to support our oversea purchases or to preserve our footing in a market in order to replace German trade. It was not by selling what goods we could scrape out of the clutches of controllers that we could achieve such objects; what was needed was a survey of the position, a conscious choice of objectives in order of their value towards winning the war. The President commented favourably on the appointment of the Export Trade Council and on Sir Andrew Duncan's measures at the Board of Trade up to date. Sir John Barlow and Mr. A. H. S. Hinchliffe gave their support to the idea of the appointment of a Minister for trade and industry, and Mr. Hinchliffe deprecated the Government's apparent notion that exports could be turned on and off like tap-water.

Isophorone

ISOPHORONE, an interesting new industrial chemical, has just been made available in commercial quantities by the Carbide and Carbon Chemicals Corporation of New York. The solvent action of isophorone on "Vinylite" resins and other plastics renders it suitable for many solvent applications, including those for which methyl amyl ketone has been used, and makes it of great value in the formulation of improved inks and stencil pastes. This product is a stable, high-boiling cyclic ketone with the formula, $COCH:C(CH_3)CH_2C(CH_3)_2CH_2$. It has a rather mild non-residual odour, and resembles cyclohexanone in several respects. While only slightly soluble in water, isophorone is miscible with the usual lacquer solvents. Although available in smaller quantities, isophorone is most economically purchased in fifty-five gallon drums.

The Livesey Professor's Report

THE first report of the new Livesey Professor at Leeds University, Professor D. T. A. Townend, D.Sc., Ph.D., D.I.C., covers every phase of the work of the Department of Coal Gas and Fuel Industries at Leeds University, and reveals details of suggested extensions in Chemical Engineering training, which in addition to providing alternative fourth-year work in the Gas Engineering Degree course, will enable a post-graduate Diploma course in Chemical Engineering to be instituted, preferably in charge of a special lecturer. Such a development will be welcomed and fill a need for which there is frequent inquiry.

In his observations on the curriculum of the Department after his first complete year's impression of its work, Professor Townend remarks that the training as at present arranged during the three years' pass degree course, corresponds in a large measure with that now given in Chemical Engineering in other British and American Universities. After two years of general work in Chemistry and Engineering, the third year is devoted to special courses, whether in Gas Engineering, or in Fuel and Metallurgy. "It is a matter of interest," he says, "that the newly arranged degree course in Chemical Engineering at London University is very similar to that which has been given in Leeds for many years past, and it is open to question whether such a course can be improved, except in detail."

Chemical Engineering Courses

IT is in regard to the fourth year's work that the courses referred to differ, for whereas at Leeds fourth year *honours* Gas Engineering students undertake research work on a suitable problem, in London extended courses in Chemical Engineering subjects are being arranged. "There may be much to be said in favour of either procedure," states Professor Townend, "but . . . there would appear to be ample room in industry for men of both types of training." In order to provide a full fourth year's course in Chemical Engineering, Professor Townend believes that the Department would benefit by filling certain gaps in its curriculum and equipment, more particularly in regard to the fuller scientific treatment of such unit processes as crushing, grinding, filtration, crystallisation, evaporation, and distillation, as well as the technology of both natural and synthetic liquid fuels including high pressure gas reactions. "Moreover, while most students attend lectures in Applied Economics in their third year, it is appreciated that further training during the fourth year in business methods generally would be advantageous." Professor Townend paid a fitting tribute to the memory of Professor Smithells, whose death occurred during the session under review, and whose work was more responsible than anything else for the establishment of the Department in 1906, and led to the establishment of the Livesey Chair in 1910.

TO STOP SILICOSIS

The Resistance–Efficiency Problem

By

SAMUEL CYRIL BLACKTIN, Ph.D.

IN this article but inadequate space can be devoted to previous efforts to solve the problem of arresting the ravages of silicosis, vast and long-continued though they are. The subject is of vital importance to many millions in many nations—truly universal—yet deadlock seems to be reached because of a technical knot which appears permanent.

Government departments everywhere have concerned themselves seriously and lengthily with finding a solution. Parliaments, particularly ours, are, as an overdue innovation, constantly and repeatedly debating the ravages of dust diseases, specifically silicosis, and their prevention. There are dozens of other dust diseases throughout industry all over the world, though none more virulent than silicosis. What are the facts regarding progress?

General Survey

The U.S.A. in 1926[1] examined dust respirator methods stretching back for generations. Numerous materials had been variedly used for stopping dust particles and passing the air. High stoppage efficiency was essential. But efficiency is—in all methods yet used—inseparably linked with resistance to breathing. They increase together. They decrease together. That is the technical knot causing deadlock. The principle of their joint functioning is shown by the curve of Fig. 1. Wearers of dust respirators feel discomfort due even to the initial dust-free resistance of the filtering device—call it natural resistance. And as the dust particles start, then continue, to clog the filtering material, discomfort becomes danger. The wearer feels he prefers the possibility of slow, procrastinated breakdown, by years or months of dust breathing, to what feels to him like quick breakdown by suffocation. He removes the respirator, conceives a complex against it, and decides to breathe dust in future, as the all-round preference.

All the dust respirators studied by the U.S.A.[1] were found to build resistance up to 1.5 in. water gauge, in use—in some cases markedly more. Perhaps they concluded that the resistance-efficiency knot of Fig. 1 could not be untied. Vast ingenuity had been expended to circumvent its technical implications. It failed. The relationship stood firm. It was despaired of ever keeping resistance minimal whilst increasing or maintaining efficiency, by means of technical refinement or manipulation.

The same story is to be repeated for Great Britain and the British Commonwealth, scientific principles being no respecters of nationalities. A "dust" respirator (against smoke) was produced in England (St. Helens, Lancs) and found usable as early as 1825. It was invented by John Roberts, "a poor collier."[2] He was awarded a large silver medal and 50 guineas by the (now) Royal Society of Arts. The *principle* used in 1825 is precisely that embodied in 1938 in the latest British production by Government departments after very thorough study and investigation.[3] There have been, of course, great refinements of technique, design, and a thorough pre-study of the characteristics of the materials and their most suitable preparation and arrangement. But although the 1825 product (whose great importance then must not be belittled) used moist cloth and moist sponge combined, as filters, and although presumably its inventor and sponsors knew nothing of the relationship or implications expressed by Fig. 1, the chief point—one almost wrote "tragedy"—is that this knot and its implications being now for many decades known, all the prodigious efforts of numerous serious workers on both sides of the Atlantic have never found it possible, though with full knowledge of the hold-up, to overcome it and embody that necessary advance in a respirator. Remembering that the ancient Chinese produced the ship's compass, we do not intend to state that no dust or smoke respirator had ever been produced even before 1825, but it may be safely stated that none before departed from the vicious resistance-efficiency knot; while it can be truly stated that none since, despite advanced technique and scientific method, has broken that significant deadlock. The arrest of dust *within* the pores, or pore entrances, or material of the filter is implicit with (a) the 1825 respirator, and (b) the 1938 asbestos 20 per cent., wool 80 per cent. (by weight), Mark IV, dust respirator; as with numerous intermediate respirators. With all, there are the controlling fundamentals, viz.: (i) resistance increase is a huge obstacle; (ii) resistance increase is never surmounted.

All these international results over so long a period mean just one thing, which is that the problem of personal dust protection is a problem where the ingenuities of improved technique applied to a venerable yet current principle cannot overcome the inherent negation imposed by that principle. Though this principle—resistance-efficiency, direct variation—arises only from persistence in a certain technique (permeating the filter with the particles) and has not therefore the general undeviation of natural law, the very persistence in accepting the necessity of its underlying technique seems to have, fictitiously, so elevated it. Ability to modify its hindrance is any fitter's "figure of merit." A discovery and application of new principle only, can surmount the barrier imposed in practice by the relationship of Fig. 1, there-

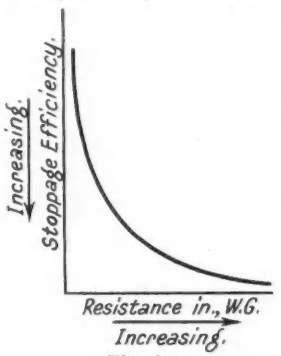

Fig. 1.

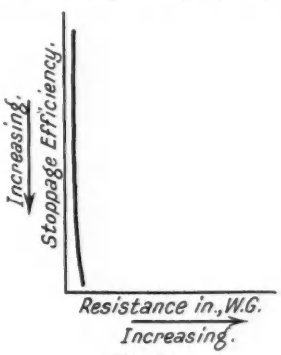

Fig. 2.

fore. Further refinements of technique of whatever nature can only somewhat modify it, where successful. But its complete breach is essential to any cure of silicosis occurrence, by way of dust respirators and general economy. Any such new discovery of principle must embody a relationship between resistance and efficiency as shown by the curve of Fig. 2. The ideal dust respirator, as regards scientific efficiency, would provide a curve asymptotic with the vertical axis.

Though efforts in the U.S.A. to reach a resistance relationship of maximum advantage[4] such as explained seem to have been abandoned or postponed, several years of thorough study of materials—whose performances we had also found similar—and refined technique in this country, resulted in the Mark IV Dust Respirator.[3] This has an initial dust-free resistance of about 0.85 in. w.g. rising to 1.6 in. after 9 hours' use. The British culmination in 1938 does not seem any substantial advance in the all-important direction on the U.S.A. practice of 1926 though there is probably an advantage in the period required to reach the resistance of 1.6 in. This high resistance is attained even though resistance per unit area is reduced by using at least two filtering pads or units. Even if most dust collects on the surface it has to be removed by periodic beating, and the destructiveness of such a procedure is evident. What may be even much more positively serious is that 20 per cent. by weight

of the filtering material is asbestos, originally in fibres of about 1 in. length; beating must break some or all of this into particles; and asbestosis, caused by breathing asbestos particles or dust, is as deadly as silicosis—which the Mark IV dust respirator is designed to prevent.

Under the resistance-efficiency deadlock of Fig. 1, retreat seems to have superseded research to overcome it. This may seem justified in view of the U.S.A., results, confirmed in 1938 in Great Britain by the lack of being able to introduce any innovation to approach the resistance-efficiency relationship of Fig. 2. The conclusions of Drinker (Harvard)[5] that ". . . any. . . dust respirators are poor substitutes for dust control and that supplying workmen with air line or dust respirators instead of installing proper dust control equipment is poor economy . . . although respirators are an important aid," though only broadcast after generations of effort to surmount an obstacle which would prove the contrary if surmounted, might at first seem warrantable. At any rate, attention has been concentrated on dust control both before and since that conclusion was reached. But can this emphasis on the control of dust at the source, ventilation, etc., ever of itself arrest the suffering and fatality occurring in many industries due to dust disease? At great expense in space, initial cost, and upkeep—warranted if more

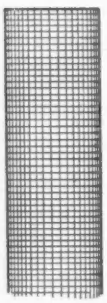

Fig. 3.

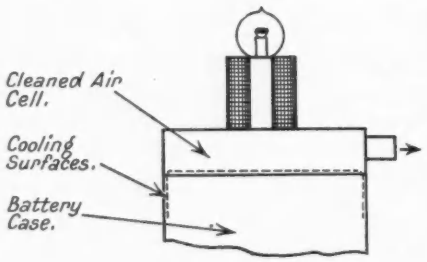

Fig. 4.

economical prevention is not available—it may do so in some industries. But consider in particular coal mining and its production of anthracosis and silicosis. Even if, eventually, with the great expense and effort of bag filtration (demanding power for, say, 1,200 cu. ft. air movement per minute); mist projectors (sometimes very effective, sometimes increasing the amount of dangerous-size particles, always liable to cause too high humidity with tubercular effects); suppression at point of production; and other methods of trapping, collection, and removal, all new-dust circulation were preventable; yet the extensive collections of coal and combustion-repression dusts would for long fill the lungs of workers. Every separate piece of coal won would have to be at once wrapped dust-tight to prevent further accumulations. Then, it must not be overlooked that though it is accepted that pure coal dust retards or prevents silicosis,[6] it yet produces anthracosis, substituting a less for a more virulent disease. Aluminium dust resulting in a crystal film on siliceous particles of $Al_2O_3H_2O$ (cs. THE CHEMICAL AGE, *41*, 1,069, 418) may be a similar expedient. No one would advocate the inhalation of aluminium dust for its own benefits! In fact, in its manufacture, prevention against breathing it is authoritatively recommended. Aluminium is compounded with silica in various natural formations, and the cause of silicosis is not yet established. These inhibitive actions of other dusts on silicosis loom more significant when preventive methods against new-dust formations are being seriously looked to as a preventive of dust disease. The relatively beneficial effect of the preponderant proportion of inhaled coal dust, as distinct from whatever accompanying particles cause silicosis, is almost now taken for granted. Siliceous particles are likely to settle more rapidly from atmospheric suspension than coal particles. Dust accumulations in mines, therefore, are likely to contain a higher proportion of silicosis-producing particles than freshly-circulating dust from the same source. There exists, therefore, a definite possibility that fresh-dust control and prevention will *not* sufficiently decrease silicosis incidence in coal mines however persisted in, or achieved eventually. Professor Drinker's relative merits allotted respectively to control and dust respirators[5] seem as though they ought to be reversed for coal mines.

The decisive battle against dust and its lung effects in coal mines is, it seems, inevitably to be fought on, or in proximity to, each individual worker. There are so many off-setting realities in the wide space between initially suppressing new-dust formation and the finality of actually breathing dust-free air.

The invaluable and long sought advantages referred to are to be gained through the application in mines of any discovery which can approach the resistance-efficiency relationship of Fig. 2. These include, in general: (a) Power saving in maintaining air movement at low constant resistance (inapplicable to respirators operated by breathing); (b) Economy in filtering materials due to probable much longer life; (c) Economy in initial expense of power unit (where applicable) and "filtering" device; (d) Economy of time in obviating cleaning or changing of "filter"; and (e) Elimination of deterioration or danger due to cleaning "filter."

The writer has discovered a principle[7] which he has embodied in one form in the Repulsor which can, in fact, be applied substantially to realise the resistance-efficiency relationship shown in Fig. 2. Separation of particles from their accompanying air can now, thereby, be obtained with negligible initial resistance and without appreciably increasing resistance as separation continues. The benefits outlined under (a) to (e) above are also achieved by the Repulsor, and most economic prevention of silicosis in mines may be achieved.

The basis of the discovery as applied to the present problem is as follows: (i) the particles are rejected or repelled by the new diaphragm (corresponding to previous filters) *while* the air is being compelled to pass through the diaphragm; (ii) as particles are not drawn upon or into the diaphragm or its interior, no obstruction to the passage of the air is set up by the particles either initially or cumulatively (both inevitably occurring with filtering units). This is a completely new departure in principle from that of current systems (Fig. 1) substituting, for unidirectional travel of particles and air (though their separation is needed), opposed directional travel. With the Repulsor the particles cannot build up a resistance to breathing because energy is never used up in bringing them into the requisite position to do so. Current methods impose: (a) that particles must be accepted and received by the filter, or other precipitation method, and passed into it as the air passes through it; and (b) that as particles are drawn upon or into the filter or its interior, an obstacle is set up by the particles, either to air passage or in some other way, both initially and cumulatively.

In applying the Repulsor principle to perform the joint functions (i) and (ii), the special diaphragm is composed of an arrangement of interstices and strands, e.g., a wire gauze of suitable mesh heated directly or indirectly to a convenient temperature in relation to its surroundings. In form, a mesh is obviously a mechanical and regularised improvement on the more or less haphazard arrangement of fibres in filters. The particles are repelled by the outer surface of the diaphragm which simultaneously permits the optimum passage of the thus cleaned air through itself. If the diaphragm forms a part or the whole of the wall of a hollow body, the cleaned air may be thus drawn into its interior and from there through tubes or adapters to the locality where it is to be used. It has been determined that the temperature to be used is well on the safe side as regards the ignition of methane and therefore of dust, and of any other circulating inflammables occurring in mines.

For use in mines a continuous diaphragm is proposed of cylindrical form, one end of which will be left open to pass the cleaned air to the recipient as indicated by Fig. 3. The repulsion area and the air passage area, respectively, of the diaphragm can be varied as required to supply clean air at required, inappreciable, constant, resistance and in suitable

volume by choosing suitable length, diameter, and number of cylinders.

It is proposed as a measure of economy where electric safety lamps are already used, to exploit the provisions incidentally offered by these. The lamp, from being a light source only, would thus become a light source and a clean breathing-air source to prevent dust disease. In arranging this, heating of the cleaning diaphragm(s) may be indirect from an electrically heated wire. The heating units will be arranged in parallel or in series in the lighting circuit, the battery supplying all energy required. The air cleaning unit will thus form a composite part of a new all-purpose lamp, and will suitably connect with the face of the worker carrying the lamp. Experiments and calculations made indicate that the dimensions of the lamp need not be very much increased, while any alteration in battery voltage or capacity is largely dependent upon suitable adjustment of the discovery to the particular case. A tentative indication of a possible arrangement for embodiment to produce clean, free-breathing air is shown in Fig. 4. To avoid slight possible discomfort due to warmth, the cleaned air may be cooled by contact with the metal lamp surfaces. There is no necessity to use the Repulsor as an integral part of a lamp. Where required it can be a separate unit, fastened to some part of the breather's body, or standing by itself any distance away. In other forms, heat dissipated by the lamp (whether electric or flame) in its capacity as illuminant may be utilised for operating a diaphragm or diaphragms. This resistance defeat is the clue to silicosis prevention,[8] by way of consequent breathing ease.

It seems strange that Davy and Stephenson (independently), were 123 years ago—just before Roberts invented his respirator—so near to this means of repelling particles while they were engaged in devising means, also utilising meshes, for repelling the passage of flames. Yet not so strange when it is realised that, searching how to dissipate heat, they would perhaps be psychologically debarred, as it were, from considering principles dependent upon utilising heat. But the wide importance of that arrangement of matter forming meshes or lattices (we already know of its sub-microscopic importance) hot or cold, seems to indicate the worthiness of comprehensive research into the macroscopic characteristics of such bodies.

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[8] Cf. Author's letter, this Journal, Dec. 16, 1939.

Fireproofing Wood*

Great Variety of Materials Available

MUCH recent research in connection with fireproofing agents has been directed towards those for use with textiles, as in the recent introduction of ammonium sulphamate by Du Pont, a valuable outlet for surplus urea which is fairly easily convertible into sulphamic acid. Efforts will doubtless be made to adapt these agents to a form suitable for use in fireproofing timber also, as this would obviously extend the market very considerably. According to Koritnig, writing in a recent issue of the German publication *Arbeitsschutz,* fireproofing should be subject to stricter regulations and specifications than at present. Builders and architects and other users of timber are less conversant with either the need or the methods of fireproofing than they should be, and fuller information and wider publicity on the subject are urgently needed.

It is necessary first to distinguish carefully between agents for the impregnation of the timber and those for coating or painting it. Both kinds must entirely remove, or at least considerably reduce, the inflammability of the wood, and should contain emulsifying agents that do not combine with water, do not cause saccharification or caramelisation of the woody fibre, assist in restraining decomposition or rotting, do not corrode metal in contact with the wood, and must be not only in themselves non-poisonous, but under no circumstances produce toxic gases or fumes.

In the paint or coating class one of the oldest and still one of the most effective is waterglass or sodium silicate in some form or other, either alone or in conjunction with other fireproofing agents such as powdered asbestos, alum, calcium chloride, alumina, etc. The silicate forms a firm, closely adherent protective layer that totally excludes air, and, what is still more important, it becomes even more effective in this way under the high temperatures arising during a fire. Materials may also be used which decompose at high temperatures and yield inert noncombustible protective gases, such as carbon dioxide or sulphur trioxide, which prevent ingress of air or oxygen and thus choke the flame or inhibit combustion altogether. In this class may be included also carbon tetrachloride which gives off inhibitive gas by evaporation. It must always be remembered that combustion consists in more or less rapid chemical reaction between the wood and the oxygen of the air, and the basic principle of fireproofing is the prevention of this reaction. Some forms of borax or boracic acid, also sodium phosphate, have been found useful in coating the surface of the wood at high temperatures with a glassy layer. Calcium carbonate (chalk or limestone) may sometimes be incorporated with sodium silicate in order to improve its suitability for certain kinds of wood; and where colour is desired it is essential that the pigment should be carefully chosen, as some of these combine with the silicate and form very undesirable compounds from a paint and fireproofing point of view.

Other suitable materials are magnesium sulphate and talc; also mixtures of solutions of ammonium sulphate and borate which yield ammonia on heating which tends to choke the flames while the borate coats the wood with a glaze. The addition of ammonium benzylnaphthalin sulphonate enables the fireproofing agent to penetrate the wood better. Iron or other metal in contact with the wood is less liable to corrode if boric or phosphoric acid, or their water-soluble salts, are employed. Some of the newer fireproofing agents contain sodium tungstate as well as sodium carbonate, also easily soluble ammonium compounds such as the acetate, bromide, chloride, or phosphate; but the action of these on the wood, under the conditions likely to arise, must be carefully borne in mind, especially the extent of charring or saccharification of the fibre, and other effects.

The patent literature of fireproofing wood is very extensive, but many of the patented methods or materials are only slight modifications of those already known. For example, in a fireproofing paint claimed in E.P. 489,464, the principal ingredient is sodium silicate—one of the first materials to be used years ago—together with lithopone and asbestos and possibly small additions of micaceous iron ore or ochre. Another preparation (E.P. 495,760) contains ammonium sulphate, ammonium acid phosphate, boric acid, colemanite, sodium fluoride and one of two other items, all of which are known.

Valuable research on the fireproofing of timber is being continued at the Forest Products Research laboratory, Princes Risborough, by N. A. Richardson and his colleagues.

* Adapted from an article by W. G. Cass in *Chemical Industries* (1940, *16*, 1, 32).

Canadian Mineral Production

New Records Established in 1939

THE High Commissioner for Canada in London has received from the Dominion Bureau of Statistics at Ottawa, a preliminary estimate of Canada's mineral production last year indicating a total value of $470,179,000, which is an all-time record for the mining industry in the Dominion. The total represents an increase of six per cent., when compared with 1938, and of three per cent. over the previous high record of $457,359,092 attained in 1937. New output records were established for antimony, gold, copper, zinc, nickel, cadmium, crude petroleum, natural gas, gypsum, sulphur, and lime. Iron ore was produced on a commercial scale for the first time in sixteen years, and considerable prospecting and development work occurred in connection with the search for metals and ores which have not as yet been produced to any great extent in Canada, but are essential for war purposes in the manufacture of various alloys. These include such metals as molybdenite, manganese, mercury, and tungsten. Several new wells were brought into production in the Alberta petroleum field. In the output of refined copper, nickel, lead and zinc, Canada is now in a better position to assist in the successful prosecution of the war than in 1914. Since that time, large refineries have been established in the Dominion for the production of the above metals.

Last year's production of metals, also a record total, reached $339,534,000, as compared with $323,075,154 in 1938, and $334,165,243 in the previous year. Production of coal, natural gas, and crude petroleum aggregated $70,757,000, as compared with $64,803,294 in 1938. Other non-metallics are up from $20,066,123 to $24,427,000 and the output of clay products and other structural materials has increased from $33,878,666 to $35,461,000.

The following table compares the output of Canada's principal mineral products in 1938 and 1939:—

TOTAL ESTIMATE OF THE MINERAL PRODUCTION OF CANADA—1939—WITH COMPARATIVE FIGURES FOR 1938.

		1938.		1939	
		Quantity.	Value. $	Quantity.	Value. $
METALLICS					
Gold ..	fine oz.	4,725,117	97,676,834	5,045,766	104,305,000
Silver ..	fine oz.	22,219,195	9,660,239	22,775,374	9,238,000
Nickel	lb.	210,572,738	53,914,494	227,089,730	51,099,000
Copper	,,	571,249,664	56,554,034	606,705,278	60,721,000
Lead	,,	418,927,660	14,008,941	391,499,038	12,375,000
Zinc	,,	381,506,588	11,723,698	394,955,897	12,066,000
Platinum metals, fine oz.		292,219	8,874,136	292,035	9,368,000
Other metals* ..	$	—	2,133,622	—	3,393,000
TOTAL ..	$	—	323,075,154	—	339,534,000
NON-METALLICS					
Fuels					
Coal	ton	14,294,718	43,982,171	15,507,000	48,098,000
Natural gas	M cu. ft.	33,444,791	11,587,450	35,187,600	12,250,000
Petroleum, crude	brl.	6,966,084	9,230,173	7,743,300	10,409,000
TOTAL ..	$	—	64,799,794	—	70,757,000
Industrial Minerals					
Asbestos ..	ton	289,793	12,890,195	353,151	15,454,000
Feldspar ..	,,	14,058	129,293	12,452	103,000
Gypsum ..	,,	1,008,799	1,502,265	1,396,098	1,879,000
Magnesitic-dolomite	$	—	420,261	—	462,000
Quartz† ..	ton	1,380,011	961,617	1,538,560	1,060,000
Salt	,,	440,045	1,912,913	423,272	2,303,000
Sodium sulphate	,,	63,009	553,307	71,679	626,000
Sulphur ..	,,	112,395	1,044,817	182,082	1,769,000
Talc and soapstone	$	—	144,848	—	164,000
Other non-metallics‡	$	—	506,607	—	607,000
TOTAL ..	$	—	20,066,123	—	24,427,000

* Includes arsenic, bismuth, cadmium, cobalt, molybdenite, selenium, tellurium and titanium in 1938 and in addition, in 1939, manganese ore, mercury, tungsten ore and iron ore.
† Includes low-grade silica sand used for fluxing purposes.
‡ Includes mica, nepheline-syenite, etc.

NEW PHENOLIC SUBSTANCES

Two new phenolic substances have been isolated from the core of fir wood by the Swedish chemist, Holger Erdtman, in a total yield of 0.8 per cent. of the starting material. The main technical interest of this discovery is believed to reside in the inhibiting action upon the sulphite pulping process as a result of the condensation of these phenols with the lignin of the wood. Chemically the new substances are 3,5-dihydroxystilbene, which is toxic to fishes, and the monomethyl ether of dihydroxystilbene.

Sedimentation and Flocculation

Rate and Volume Discussed

AT the meeting of the Institution of Chemical Engineers held in the Geological Society's rooms at Burlington House, London, W.1, last Tuesday, Mr. M. B. Donald presented a paper on "Sedimentation and Flocculation." He pointed out that the relation between these two processes was a very close one, though as yet the connection had not been sufficiently established to guide chemical engineers in solving practical problems, and the paper was an endeavour to summarise the present position. Mr. Donald's paper consisted principally of an exposition of the experimental methods used to re-determine results where the original theories were conflicting; in certain cases new experiments were devised. Recent work of importance on the rate of sedimentation of estuarine mud (by the Water Pollution Research Board) and on much thicker clay suspensions (by the author) was recorded. It was noted that if the clays were peptised with alkali the rate of sedimentation remained constant up to the "critical point," when the rate of settling drops suddenly, but if they were flocculated with acid the rate of sedimentation accelerated with time; thus the amount of acceleration should afford a means of estimating the degree of flocculation. Causes of the variation in sedimentation volume were likewise examined.

Thixotropy

Of further interest were the results obtained in re-examining the condition of thixotropy, especially in relation to the postulate of H. Freundlich, in a recently published book and elsewhere, that substances which are thixotropic, i.e., which exhibit an isothermal sol-gel transformation, such as bentonite in water, give large sedimentation volumes. The sedimentation volume of zinc oxide was determined in various solvents. The order was found to be greatest for water and then decreasing in ethyl alcohol, carbon tetrachloride, toluene, ether, turpentine and least in paraffin (kerosene). The last three liquids gave a slightly cloudy supernatant liquid. According to Freundlich's postulate one would expect zinc oxide to have the largest volume in paraffin. An experimental determination of the sedimentation rates showed that zinc oxide in water gave a marked accelerating rate indicating a high degree of flocculation. In paraffin the rate was almost constant and it would thus appear that zinc oxide was thixotropic in its deflocculated condition. Correspondence with Mr. Pryce-Jones, who had selected the zinc oxide in paraffin system in previous work, brought the suggestion from him that zinc oxide in paraffin was still flocculated to some extent since the flocs could be seen under the microscope. He showed that if the zinc oxide were mixed with blown linseed oil it could be clearly seen under the microscope to be peptised and different from the condition in paraffin.

Flocculation and Peptisation

In his book Freundlich indicates that thixotropy is a state between coagulation and a stable sol. On this basis it would seem reasonable to assume the analogy that thixotropy is shown by systems which are in a stage intermediate between flocculation and peptisation. Further, according to Goodeve and Whitfield, if a steady shearing force is applied to a fluid an equilibrium is set up between the spontaneous building up of internal structure and its breakdown due to the shearing force. If the internal structure is built up very rapidly as in highly flocculated suspensions or very slowly as in almost peptised suspensions, the equilibrium will be so much displaced to one side or the other as not to give rise to any noticeable effects. However, if the rate of building up of internal structure takes up an intermediate and finite value then the remarkable phenomena known as thixotropy becomes more evident. This view of thixotropy would also indicate that it is essentially an intermediate state between flocculation and deflocculation, i.e., between large and small sedimentation volumes.

River-Borne Sands of India
Ilmenite, Monazite and Zircon

AN interesting abstract concerning the production of ilmenite, monazite and zircon in Travancore State, South India is published in the *Bulletin of the Imperial Institute* (1939), *37*, 4, 650-2. The topography of the area is particularly favourable for the deposition of the minerals concerned, as there are numerous rivers which spread out into lagoons near their mouths; the heavier minerals are deposited on the dunes and beaches and are subjected to continual sorting and concentration by the action of wind and wave. Electro-magnetic separators are used for the zircon, while wet and dry tabling is also employed to separate the other minerals.

The ilmenite from the Quilon area is the highest in titanium dioxide (rutile) of any commercial deposit in the world, a typical analysis giving TiO_2, 60.35; Fe, 22.69; SiO_2, 0.41; S, 0.01; P, 0.03 per cent. The rapid growth of Indian ilmenite production is due principally to the expansion of the titanium pigments industry, although a large quantity of the mineral is employed in the manufacture of ferro-titanium. As evidence of the extent of the titanium pigments industry in the United States it is estimated that in 1937 sales amounted to 126,000 tons, of which about two-thirds went into paints, the remainder being used in paper, rubber, floor coverings, leather, etc.

The monazite sands were discovered in 1909 and production started in 1911. Since 1918 India has been the principal producer. A recent analysis of the monazite gave the following result: ThO_2, 8.3; CeO_2 and other rare-earth oxides, 61.7; Fe_2O_3, 0.1; P_2O_5, about 29.0 per cent. Monazite is used as the source of thorium nitrate, an essential constituent of the incandescent gas mantle, and this industry formerly consumed large quantities of monazite. With the wider application of electric light, however, production fell away for a number of years, but more recently an increased demand has been caused by the development of new uses for the mineral. These include the manufacture of ferrocerium (the well known pyrophoric alloy) and other cerium alloys, the use of cerium in compounds for proofing cloth against mildew, as a colouring agent in topaz-yellow glass, as an arc stabiliser in carbon arc lamps and as an opacifier in enamel. Exports from India now amount to about 2,500 tons annually.

Exports of zircon from India in recent years have also been on the increase, though the figures are somewhat irregular, probably as a result of competition from Australian deposits. During the past few years Indian exports have averaged about 2,650 tons per annum. An average analysis of a number of shipments gave the following result: ZrO_2, 66.8; SiO_2, 31.5; TiO_2, 0.84; Fe, 0.08; P_2O_5, 0.07 per cent. The uses of zircon are principally in the manufacture of refractory crucibles, special porcelains for insulators, refractory cements and heat-resisting glass. It is also the principal raw material for the manufacture of zirconium oxide and salts, the most important of which are the zirconium opacifiers which are now supplanting tin opacifiers in enamels, particularly in the United States. Zirconium metal is used in photoflash bulbs, radio valves, ammunition primers and spot-welding electrodes.

Letters to the Editor
Supply of Chemical Plant

SIR,—In the recent notice from the Controller of Dyestuffs, he rightly made two essential points that the requirements of the Forces and our export trade should take precedence in any demand upon home or imported supplies of dyestuffs.

These points will receive public support and certainly that of the British Chemical Plant Manufacturers' Association whose plant is used for home productions. However, the Controller goes on to state that one of the two main difficulties in increasing home productions is that delivery of new plant for extensions cannot be obtained at a "normal rate." I think this is a statement that requires some amplification.

I have been in communication with a number of members of the British Chemical Plant Manufacturers' Association for the purpose of ascertaining the position as regards the production of chemical plant. In several instances I have found that the deliveries of plant have been delayed owing to difficulty in obtaining the supply of the necessary mild steel due to shipbuilding and Admiralty requirements. Some members have, however, been in the position of effecting practically normal deliveries, and one maker advises me of being able to supply fairly complex chemical plant and equipment within a "reasonable time."

Dealing with castings for chemical plant, the position is rather different, and it would seem that deliveries of this material are being effected at a fairly "normal rate."

It has to be borne in mind that the position with which makers are now faced is that the demand for plant is considerably in excess of normal production, so that some delay in completion of larger orders is unavoidable. It is quite certain that British chemical plant manufacturers will do all they possibly can to facilitate the manufacture of plant, to arrange for deliveries in a reasonable time, and as far as possible to avoid delay so that no serious inconvenience should result to those anxious to extend our dyestuffs output.

Yours faithfully,

London, W.1., February 7. J. W. WRIGHT, Chairman,

The British Chemical Plant Manufacturers' Association.

B.S.S. for Luminous Paint
Preliminary Draft of Test Available

THE British Standards Institution has recently published, as one of the series of BS/ARP Specifications being prepared at the request of the Air Raid Precautions Department of the Ministry of Home Security, a Specification (BS/ARP 18) for fluorescent and phosphorescent paint for A.R.P. purposes.

This specification was prepared by a Joint Committee of the Illuminating Engineering Society and the A.R.P. Department of the Ministry of Home Security, and was submitted to the B.S.I. for publication. The specification covers fluorescent and phosphorescent paints having a maximum brightness of 0.01 equivalent foot candle. A method of testing brightness is included. It is realised, however, that measurement of brightnesses of the order of 0.0001 equivalent foot candle by the method indicated may be difficult for laboratories not specially equipped for this work, and the committee is therefore endeavouring to provide a simple form of brightness test, which, when completed, will be issued as an addendum to the specification. A preliminary draft of this simple form of test is available for comment on application by anyone interested, although it must be understood that it cannot be regarded as a standard test until published as such.

Copies of the specification can be obtained from the British Standards Institution, Publications Department, 28 Victoria Street, London, S.W.1, price 6d. net, 8d. post free.

TRADING WITH THE ENEMY

The Board of Trade, in a general licence dated February 5, 1940, authorise the London Chamber of Commerce to pay freight, where this has not already been paid, and other necessary charges to or for the benefit of any enemy, on behalf of the owner of any cargo in a ship lying at a port in any country not being enemy territory, for the purpose of obtaining possession of that cargo, provided that sums paid in respect of charges other than freight shall not exceed an amount equal to 5 per cent. of the original c.i.f. invoice value of the cargo. The general licence dated November 24, 1939, is revoked.

Foire de Paris

Franco-British Solidarity

ENCOURAGED by offers of support from all quarters and undaunted by the unknown risks that lie ahead, the Committee of the Foire de Paris announce their 32nd annual Trade Fair—to be held, as usual, in May—from May 11 to 27. The abandonment of this important commercial and industrial event, at a time like the present when manufacturers are faced with an entirely changed economic situation, might well suggest the relaxing of the policy pursued by the Governments of both France and Great Britain—a policy having as its fundamental principle Franco-British solidarity. It is the hope of the committee that the Paris Fair will be the means of furthering still more this valuable co-operation and of binding together the industrial interests of both nations. At the same time the international aspect of the Fair will not be forgotten.

In deciding to hold the Fair as usual this year, at the Porte de Versailles, committee and exhibitors alike are showing the same courageous spirit as in 1917 when a similar decision was made in circumstances even more alarming than those of the present day. At that time, the German trenches were only 100 kilometres from the capital.

Among the principal exhibits of special interest to the chemical industry, there will be sections devoted to acetylene and liquid air; chemical products; cleaning and polishing materials; gas distribution and appliances; inventions, machinery and tools; paper; rubber goods; and scientific instruments.

Inventions Competition

This important and always popular competition is being organised, as usual, in connection with the Fair. Last year 769 inventions were submitted by 517 competitors, representing 15 countries. In spite of adverse financial conditions, the committee are making no changes in the value of the prizes this year. The figure devoted to this purpose will still be 25,000 francs, as on previous occasions. In addition, there will be the usual medals, diplomas and prizes offered by the President of the Republic, Members of the Government and other Paris bodies. All persons wishing to compete should send in their application form (obtainable from the London Office of the Fair, at 17 Tothill Street, S.W.1, or direct from 23 rue N.D. des Victoires, Paris 2) not later than March 31. The inventions themselves should arrive at the Exhibition Grounds, Porte de Versailles, Paris (15), by May 3 at the latest.

Anglo-French Trade Talks

F.B.I. Sponsors London Meeting

WITH the approval of His Majesty's Government and of the French Government, arrangements have been made for a meeting between British and French industrialists for the purpose of discussing economic and commercial questions of common interest. The Federation of British Industries has invited the Confédération Générale du Patronat Français to send a small delegation to London, and this invitation has been accepted.

It will be the object of the meeting to discuss the views of the industries of both countries on the means by which British and French industry can best co-operate during the war for the attainment of the common objective, and for the solution of any difficulties which may confront them; also on the means of collaboration by which after the war the industries of the two countries could jointly contribute to an orderly change-over from war to peace conditions and to the creation of a more sound and stable world economic system.

If, as is confidently expected, it is found that there is agreement on points of principle, it will be the object of the meeting to encourage conversations between individual industries in the two countries, in order that practical effect may be given to the principles upon which agreement has been reached.

Phenylarsinic Acid

Delicate Reaction Involved in Production

WRITING in *Génie Civil*, Professor Luis Blas of Madrid makes some interesting remarks on the industrial production of phenylarsinic acid, the basis not only of war arsines, but also of the medicinally used arsenic compounds. The typical industrial reaction, he points out, is to combine diazobenzene chloride with sodium arsenite, as follows: $C_6H_5-N=N-Cl+AsO_2Na_3=C_6H_5AsO_3Na_2+ClNa+N_2$. This reaction with a diazote is extremely delicate, and results, industrially, in a considerable loss in production due to secondary reactions, and sometimes to complete absence of the desired reaction. This can be avoided by the use of proper precautions in the preparation of the raw materials. Quantities of raw material for the production of the diazote must be carefully measured. They are 20 kg. sodium nitrite to 28 kg. aniline and 20 kg. hydrochloric acid. The reaction should take place at a temperature of less than 5° C. The arsenite is produced by a combination of 35 kg. of arsenic anhydride with 45 kg. of sodium hydroxide. As a catalyst, 2 kg. of copper sulphate was used for each operation. The reaction of the NaOH and the As_2O_3 can take place at normal room temperature, or slightly below, say between 13 and 18° C., and the chemicals must be maintained in a state of constant agitation in the vat in which the reaction is taking place.

Using 1,500 litres of water as a solvent for the quantities he gives, Professor Blas was able to obtain 46 per cent. of the theoretical production after two hours' reaction. Increasing the time gave no further production. The next test was to determine the effect of dilution. Various quantities of water were used as solvents for 35 kg. of arsenic anhydride and 45 kg. of sodium hydroxide. At 250 litres of water, a production of 50 per cent. was obtained, efficiency falling off when the dilution was increased or diminished beyond this point. Varying the quantity of catalyst was also tried, the most effective quantity being 2 kg., below which the reaction lost efficiency, and above which it failed to improve.

In the case of the reaction of the arsenite with the diazote, it is necessary that this should occur in an alkaline medium. However, while normal practice would suggest the use of NaOH in excess, actually its presence seems to cause the formation of colouring matter and of froth at the expense of the diazote which therefore fails to react with the arsenite. Instead, Blas tried a mixture of 20 kg. of NaOH and 130 kg. of Na_2CO_3. This arrangement gave an efficiency of 87 per cent. in the reaction, while greater or smaller quantities of the carbonate produced less good results. The speed at which the two liquids were poured into the reaction vessel also affected the results, the best being obtained when the arsenite was poured in at three times the speed of the diazote. The final conclusion was, that by careful regulation of the variable factors of the reaction, an efficiency as high as 91 per cent. is obtainable.

New Control Orders

Non-Ferrous Metals

THE Minister of Supply has made a Direction (No. 2) under the Control of Non-Ferrous Metals (No. 5) Order, 1939, increasing the maximum prices for copper, lead and zinc by the following amounts where deliveries of metal are called for in lots of less than four tons :—

Amount	Extras per long ton		
	Copper	Lead	Spelter
	£ s. d.	£ s. d.	£ s. d.
For lots over :—			
2 tons and under 4 tons ..	2 0 0	1 0 0	1 0 0
1 ton up to and including 2 tons	3 0 0	1 10 0	1 10 0
For lots of 1 ton and under ..	4 0 0	2 0 0	2 0 0

The Direction will come into force on February 19, and the Controller will charge the above extras in contracts made by him on and after that date.

PERSONAL NOTES

The engagement is announced of MR. J. DAVIDSON PRATT, O.B.E., general manager and secretary of the Association of British Chemical Manufacturers, and Miss Anne Jones, of Barbados, B.W.I. The marriage will take place at Easter.

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DR. C. H. DESCH, F.R.S., has been appointed scientific advisor to the Iron and Steel Industrial Council. The address of his office is 4 Grosvenor Gardens (the Iron and Steel Institute offices), London, S.W.1.

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The L.M.S. Railway Company announces that the Herbert Jackson Prize for 1939 has been awarded to MR. H. ANDREWS, of the Engineering Section, Research Department, Derby, for his paper entitled "The Development of a Refrigerating Machine for use on Trains."

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At a meeting of the Directors of the Manchester Chamber of Commerce last Tuesday, MR. ANGUS D. CAMPBELL was appointed President for the coming year, in place of MR. FRANCIS GRUNDY, whose presidential address is recorded on another page.

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DR. S. C. BLACKTIN, who contributed an article on silicosis to this issue of THE CHEMICAL AGE, has made himself a recognised authority on dust and its properties. He has the Ph.D. degree of Sheffield University in the Faculty of Engineering and has made important researches on the physical characteristics of filtering materials for industrial respirators. He is the inventor of the Electrotor Dust and Smoke Meter, and the Direct-View Particle-Counter and Portable Ultramicroscope, for aerosol determinations. His principal award for his inventions is the Grey Wilson Memorial Gold Medal, the highest award of the Institute of Patentees, for the Electrotor, which makes countable and weighable, with maximum convenience and economy, the particles in known volumes of air and gases.

OBITUARY

COLONEL SIR HERBERT PARSONS, BT., a director of Phosferine (Ashton and Parsons), Ltd., died recently, aged 69.

MR. WILLIAM GEORGE TIMMANS, for 32 years managing director of the Basford Chemical Company, Vernon Road, Nottingham, died recently aged 76.

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A memorial service was held at St. Giles's Church, South Mimms, for MR. EDWARD LAWRENCE HAMILTON, late Chairman of the Rubber Growers' Association, who died at Sidmouth, at the age of 81.

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MR. DAVID STUART PATON, of Kirkpatrick, Barr, and Paton, London, died recently at the age of 79. In 1876 he joined the firm of Middleton and Kirkpatrick, chemical merchants, Glasgow, and four years later went to the London branch of the business, which, in 1900, became Kirkpatrick, Barr, and Paton. He was also a director of the associated firm of Paton, Schulz and Co., Ltd.

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We regret to announce the death on February 11 of MR. C. A. MERCER, governing director of Pownson and Mercer, Ltd., scientific instrument makers, of Camomile Street, London, E.C.3. Mr. Mercer was in his 78th year and had been with the firm for 57 years. He was founder of the British Laboratory Ware Association and Past Master of the Wheelwright Company.

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MR. HENRY LIVINGSTONE SULMAN, whose death at the age of 79 was recently reported, was a prominent figure in the world of metallurgy and had for many years been a partner in the firm of Sulman and Picard, consulting metallurgists. He was a Fellow of the Institute of Chemistry and past president of the Institution of Mining and Metallurgy, which awarded him its gold medal in 1919 for his contributions to metallurgical science, notably his work in the development of the flotation process for the treatment of ores.

SIR PERCY COLEMAN SIMMONS, a director of Beecham Maclean Holdings, has left estate valued at £139,888 (net personalty £53,210).

A Chemist's Bookshelf

A POCKET MEDICAL DICTIONARY, by Lois Oakes, assisted by T. B. Davie; fourth edition. Edinburgh: Livingstone. Pp. xx and 409. 3s. 6d.

This handy little volume has run into four editions since its first appearance in 1933—a sufficient testimony to its value. The present edition has been provided with an appendix on first aid, which should appreciably widen its sphere of usefulness. The list of medical terms has been kept very well up to date, though the omission of one or two of the most modern drugs may be detected; but some of the dates in the historical information at the end might be revised: e.g. those of Marie Curie and Sigmund Freud.

CHEMISTRY IN THE SERVICE OF MAN, by Alexander Findlay; fifth edition. London: Longmans. Pp. xx and 398. 8s. 6d.

A fifth edition of this pleasant and informative work is very welcome. Professor Findlay has not only revised the material in the light of knowledge to-day, but he has also partially rewritten the work, allotting different proportions to different subjects "so as to reflect more completely the cultural and practical aspects of present-day chemical science," as he very aptly words it in the preface to this edition. The style is as easy and flowing as ever and the book can be read with enjoyment and profit by chemist and layman alike. The sections on chemotherapy, vitamins, hydrogenation, the synthesis of rubber substitutes, and the production of synthetic resins and plastics are thoroughly up to date and provide an excellent general account of the recent progress of chemistry in the service of man. Professor Findlay is up-to-the-minute in giving us the structural formula of Nylon: $[-NH.(CH_2)_5.NH.CO.(CH_2)_8.CO-]_n$

SCIENCE FRONT 1939, by F. Sherwood Taylor. London: Cassell. Pp. 301. 7s. 6d.

Where Professor Findlay is general, Dr. Sherwood Taylor is particular, as his book deals entirely with the progress of science during the last few years—one might almost say the last few months. On the other hand "Science Front, 1939" deals with a variety of aspects of science and is not exclusively devoted to Chemistry. The more strictly chemical chapters are the first seven and they deal with such widely varied subjects as "Science and Plant Growth" and "The Shock Treatment of Schizophrenia." Dr. Sherwood Taylor has an agreeably pungent way of making his points, and his book affords thoroughly pleasant reading. His up-to-dateness is evidenced by his treatment of the chemistry of the "permanent wave"; by the full account of the beneficent sulphanilamide drug M & B 693, called Dagenan after the laboratories where it was produced; and above all by the exposition of Kögl and Erxleben's work on the enantiomorphic proteinases, which bids fair to provide an explanation of the cause of cancer and may possibly lead to a method of curing the disease. It is no simple matter to present stereochemical ideas to the layman in a way that can be understood, and Dr. Taylor is to be congratulated on his success here.

General News——————From Week to Week

THE ENTIRE SHARE CAPITAL of Davey Paxman & Co. (Colchester), Ltd., oil engine builders and boiler manufacturers, has been acquired by Ruston & Hornsby, Ltd.

FOLLOWING THE READING OF A PAPER entitled "Pool Grades of Gas, Diesel and Fuel Oil" at a recent meeting of the Institute of Fuel, Mr. R. J. Bressey, one of the authors of the paper, stated that it was the aim of the Petroleum Board to have one per cent. maximum sulphur content for gas oil, 1.5 per cent. for Diesel oil and 2½ per cent. for pool fuel oil.

A GENEROUS CONTRIBUTION to the national war finance campaign is being made by Boots Pure Drug Company in the form of a gift of 750 National Savings Certificates to their 20,000 employees throughout the country. The certificates will be allotted by ballot to employees who join a National Savings scheme which the firm has adopted.

A PROPOSAL TO FOUND an Academy of Austrian Scientists and Artists in Great Britain was considered at a meeting in London on Monday. Sir George Franckenstein, the former Austrian Ambassador, who is now a British subject, will be the first honorary president. Baron Fuchs, who presided, said that the Academy would be devoted to scientific research and would be strictly non-political.

OWING TO THE DEARER MARKET for raw materials, Messrs. May & Baker, Ltd., advise an increase in the prices of sodium tartrate and potassium B.P. (Rochelle salt), Seidlitz powder B.P. and double Seidlitz B.P.C. Rochelle salt is advanced 5s. per cwt., Seidlitz powder 3s. 9d. per cwt., and double Seidlitz 4s. 3d. per cwt. Sodium and potassium soda pot. tartrate crystals are 2s. 6d. per cwt. higher than powder.

FOLLOWING AN OFFER from William Dixon, Ltd., coal and iron masters, Glasgow, to supply the city with 5,000,000 cubic feet of coke-oven gas per day, the Gas Committee of Glasgow Corporation decided at a meeting last week to continue consideration of the offer, and appointed the convener, subconvener, and general manager to negotiate with Messrs. Dixon with a view to concluding an agreement covering a period of years and also discussing with the firm the disposal of by-products.

PEOPLE TALK A GOOD DEAL about war aims, but seem to forget that winning the war must come first. What should be our war policy? The late Professor Trotter, Sergeant-Surgeon to the King, had some provocative things to say on the subject in his famous book "Instincts of the Herd in Peace and War." A new edition of this classic is published this week at 5s. by our associated company, Ernest Benn, Ltd., and is obtainable from all booksellers or libraries or direct from the publishers, Bouverie House, Fleet Street, London, E.C.4.

AS COMPARED WITH DECEMBER the average of wholesale prices in January showed a rise of about 2½ per cent., the index numbers for the two months being 123.8 and 120.9 respectively; food prices increased by 3.0 per cent. and those of industrial materials and manufactures by 2.1 per cent. Compared with January, 1939, the general index was 27½ per cent. higher, with food prices up by 33½ per cent. and industrial materials and manufactures marking an advance of 24 per cent. For chemicals and oils the index figure is 108.7, as compared with 105.5 in December, 1939, and 92.6 for January of that year.

IN A DISCUSSION at the Engineering Club, Manchester, on February 14, arranged by the British Association of Chemists, Mr. W. A. Silvester, of Imperial Chemical Industries, Ltd., dealt with the question of "Is not present university education too academic to meet the needs of would-be industrial chemists?" His principal complaint was that the wide range of industrial occupations now available to chemists was not covered by the existing departments in some of the smaller universities. The graduate had an insufficient acquaintance with foreign books, little or no knowledge of desk technique and his writing tended to prolixity and vagueness. As a possible remedy he suggested revising lists of text books for guidance in reading, and said that patent specification literature should not be despised.

THE IMPORTANT PART played by Aberdeen in the development of bleaching methods was described by Dr. Clow, assistant in the chemistry department of Aberdeen University, in a lecture which he gave to the Aberdeen Business and Professional Club last week. Dr. Clow related that when travelling on the continent in 1787 Professor Copeland, Professor of Natural Philosophy at Marischal College, Aberdeen, was shown that chlorine was more effective for bleaching than sulphuric acid, which had been used previously. Professor Copeland, on his return to Aberdeen, took the idea to a local firm of manufacturers. In 1787 this firm adopted the method of bleaching by chlorine gas. A patent for making bleaching powder—one of the greatest forward steps in the Scottish chemical industry—was obtained by Charles Tennant in 1797.

Foreign News

TRINIDAD CONSOLIDATED OILFIELDS recently announced that production for January totalled 41,000 barrels.

IMPORTANT HELIUM SOURCES have been discovered in several districts in Rumania (Oltenien, Bucsani, Vlandeni, Manesti).

THE EXPORT OF SULPHATE OF COPPER from Italy will in future be subject to ministerial licence.

BY A DECREE of January 15, all customs duties on imports into Hungary of heavy coal tar oil, sulphite lye, arsenic acid and methyl chloride have been abolished.

THE NATIONAL INSTITUTE OF CO-OPERATION of Rumania has purchased 250 tons of copper sulphate from Great Britain, for delivery before the end of February.

THE RUSSIAN RAILWAYS ARE EXPERIMENTING with oxydiphenyl and arsenic compounds as impregnating materials for railway sleepers in place of creosote.

NEW MAGNESITE AND CHROME ORE DEPOSITS have been located in Yugoslavia to the west of Sarajevo. In one place the deposits are only 40 feet below ground.

AN EXPLOSION of 6,000 lbs. of nitroglycerine, which killed two workmen, occurred recently at a plant of the Du Pont de Nemours Company, at Gibbstown, New Jersey.

SWEDEN IS COMMENCING the manufacture of acetate rayon from sulphite pulp. A factory at the Norrköping artificial silk and staple fibre works is being built for this purpose.

GLASS OF VERY LOW HEAT CONDUCTIVITY and nearly colourless has been recently produced in the Leningrad Optical Institute and may find application in the manufacture of protective glasses for acetylene welders and cutters.

A NEW PROCESS OF WOOD SACCHARIFICATION developed for treatment of Swedish woods by the A/B Defiltrator of Stockholm is reported to give a yield of 10-30 per cent. sugar and 5-15 per cent. methyl alcohol (based on the weight of wood).

THE ADMINISTRATION OF THE Yugoslav Solvay factory, a Belgian concern, is planning to build a factory at Lukavac for the production of calcium chloride as a by-product of its alkali plant.

A NEW FACTORY for calcium cyanamide manufacture is under construction at Stokvik (Sweden) by the Stockholm Superfosfat Fabriks A.B., which has raised its capital from 9 to 12 million kroner in order to finance the new enterprise.

AMMONIUM CHLORIDE is to be manufactured in Canada for the first time, by Canadian Industries, Ltd., at their Hamilton, Ontario works. The manufacturing plant, which will cost 200,000 dollars, is now under construction.

SEVERAL IRAQ MANUFACTURERS have signed an important contract with a Sheffield firm for the erection of a large cement works on the banks of the Tigris, near Bagdad. This will be Iraq's first cement factory.

A NEW COMPANY, the Hütten-Chemie G.m.b.H., has been formed at Mannheim with a capital of 1,000,000 Rm. to undertake the production of heavy chemicals of all kinds. The directors are Otto Berger and Dr. Hennenberger.

EXPORTS OF SULPHUR from Norway during the period January to September, 1939, increased slightly to 48,266 metric tons, compared with 47,492 metric tons in the corresponding period in 1938. Exports of cuprous pyrites during the same periods dropped from 291,347 tons to 233,100 tons and exports of non-cuprous pyrites increased from 181,163 to 230,121 tons.

CRUDE PETROLEUM OUTPUT in Rumania for November, 1939, was 507,000 tons, as against 525,252 tons for November, 1938. Total output for the 11 months of the year was 5,715,000 tons, as against 6,084,768 tons for January-November, 1938.

THE STANDARD OIL CO., of New Jersey, U.S.A., has announced that it has acquired the rights for the production of synthetic rubber from the I. G. Farbenindustrie of Germany and has offered to license rubber companies in New York to utilise this material for their own requirements.

RUMANIAN EXPORTS OF PETROLEUM last year, according to recent statistics published in Bucharest, totalled 4.51 million tons, 1.2 million tons of which went to Germany (including Czecho-Slovakia and Austria), 650,000 tons to Italy, 500,000 tons to the British Empire, and 250,000 tons to France and her colonies.

AN INSTALLATION for the production of petrol from native petroleum has been opened in Morocco—not, as is usual, a refinery, but simply a distillation plant, in which the petroleum is distilled to remove the most volatile fractions, before being shipped to France for refining. A production of about 30 per cent. has been attained with native petroleums by this method, and the initial results have encouraged the French Government to undertake further prospecting operations in Morocco.

THE S. A. STABILIMENTI DI RUMIANCA of Turin is erecting a new white arsenic plant on behalf of the Chemical Service Department of the Italian War Ministry. On completion of the new plant in spring 1940, the combined output of the new works and the smaller plant at Pieve Vergonte will be adequate to supply Italian requirements of white arsenic. The company will also erect a plant for the manufacture of arsenicals, and a sulphuric acid establishment.

CHESTNUTS ARE UTILISED in Germany as a source of alcohol by the process of German Pat. 681,163 (Kastanien-Werke G.m.b.H.), whereby the toxic action of the saponins upon yeast, which was previously an obstacle to fermentation, is prevented by adding from 0.7 to 1 per cent. of a higher alcohol (amyl, butyl alcohol) or a polyhydric alcohol (ethylene glycol, glycerine) to the mash. The higher alcohol accumulates subsequently in the fusel oil and can be used over and over again.

THE FEDERATED MALAY STATES imported chemicals, drugs, dyes and colours to the value of 1,170,291 dollars during the second quarter of last year. Of the above total, goods to the value of 329,965 dollars came direct from the U.K.

Forthcoming Events

A SERIES OF CANTOR LECTURES on "The Social and Economic Development of the British Colonial Empire" will be given on Monday afternoons, February 26 and March 4 and 11, at the Hall of the Royal Society of Arts, John Street, Adelphi, London, W.C.2 The lecturer will be Sir William H. McLean, K.B.E., Ph.D., M.Inst.C.E., and the chair will be taken at 4 p.m. on each occasion.

THE JUBILEE MEMORIAL LECTURE of the Society of Chemical Industry will deal with "Recent Advances in the Applied Chemistry of the Rarer Metals." The lecturer is Mr. R. H. Atkinson, of the Mond Nickel Co., Ltd., and the lecture will be delivered on February 27, at 6 p.m., in the Chemistry Lecture Theatre of the University of Sheffield, Western Bank, Sheffield.

THE 36TH ANNUAL LUNCHEON of the Commercial Motor Users' Association will be held at the Savoy Hotel, London, on March 5, when the Minister of Transport, The Rt. Hon. Capt. Euan Wallace, M.C., M.P., has promised to respond to the toast of "His Majesty's Ministers."

THE ANNUAL GENERAL MEETING of the Society of Public Analysts and Other Analytical Chemists will be held at 2.45 p.m., on March 6, at the Chemical Society's Rooms, Burlington House, London, W.1. The President, Professor W. H. Roberts, will deliver his Presidential Address and the election of officers and council for the ensuing term will take place.

A JOINT MEETING of the Yorkshire Section, Society of Chemical Industry with the North-Eastern Branch of the Institute of Sewage Purification will be held on March 18 in the Hotel Metropole, Leeds. Mr. J. H. Garner will speak on the Public Health (Drainage of Trade Premises) Act, 1937. The meeting will follow a visit to the works of the Leeds Fireclay Co., Ltd. Details will be circulated later.

Inventions in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Applications for Patents

RECOVERY OF VAPOUR PHASE MIXTURES.—A. Abbey (Dow Chemical Co.). 1655.

METHOD OF PREPARING MELAMINE.—American Cyanamid Co. (United States, April 4, '39.) 1940, 1641.

PRODUCTION OF ORGANIC COMPOUNDS.—American Cyanamid Co. (United States, April 8, '39.) 1640, 1641.

METHOD OF PRODUCING OIL COMPOSITIONS.—American Cyanamid Co. (United States, Feb. 25, '39.) 1702.

PROCESS FOR MANUFACTURING SULPHATED SELECTIVITY CALCINED DOLOMITE.—American Zinc, Lead, and Smelting Co. (United States, Feb. 4, '39.) 1542.

PROCESS OF CALCINING COMMINUTED LIMESTONE.—American Zinc, Lead, and Smelting Co. (United States, Feb. 23, '39.) 1543.

HYDROGEN PEROXIDE and the application thereof.—E. Berl. 1843.

PROCESS FOR PRODUCTION OF A GEL COMPOUND from plants, etc.—Celec Corporation, Ltd., and C. S. Townsend. 1591.

PROCESS FOR PREPARATION OF DERIVATIVES OF OESTRADIOL.—Chinoin Gyógyszer és Vegyeszetï Termekek Gyara Részvénytársasag (Dr. Kereszty and Dr. Wolf). (Hungary, Jan. 28, '39.) 1590.

PURIFICATION OF COMPOSITIONS containing sulphonyl halides.—Colgate-Palmolive-Peet Co. (United States, June 29, '39.) 1828.

PREPARATION OF ORGANIC MATERIALS.—Colgate-Palmolive-Peet Co. (United States, June 29, '39.) 1829; (United States, Oct. 21, '39.) 1830; (United States, Nov. 2, '39.) 1831.

Complete Specifications Open to Public Inspection

MANUFACTURE OF BROMOBENZANTHRONES.—E. I. du Pont de Nemours and Co. June 21, 1938. 18137/39.

PROCESS FOR THE PREPARATION OF A COMPOUND having vitamin E activity.—K. Merck, W. Merck, L. Merck and F. Merck (trading as E. Merck (firm of)). June 25, 1938. 18126/39.

PROCESS FOR SENSITISING SILVER HALIDE EMULSIONS containing colour formers.—I. G. Farbenindustrie. June 23, 1938. (Cognate Application, 18204/39.) 18203/39.

REFINING OF BENZINE.—Hydrierwerke Scholven, A.-G. June 27, 1938. 18552/39.

TREATMENT OF ESTERS containing vinyl groups.—E. I. du Pont de Nemours and Co. June 25, 1938. 18568/39.

Specifications Accepted with Date of Application

MANUFACTURE OF TRIARYLMETHANE DYESTUFFS.—W. W. Groves (I. G. Farbenindustrie.) July 13, 1938. (Addition to 472,757.) 516,930.

POLYMERISATION OF UNSATURATED ORGANIC COMPOUNDS.—E. I. du Pont de Nemours and Co. July 13, 1937. 516,931.

COMPOSITIONS AND PROCESS for the preparation of azo-colours on the fibre.—Chemical Works, formerly Sandoz. July 15, 1937. (Samples furnished.) 517,030.

PROCESS FOR THE MANUFACTURE OF REACTION PRODUCTS from aromatic hydrocarbons.—I. G. Farbenindustrie. July 17, 1937. 516,936.

PRODUCTION OF DIELECTRICALLY HIGH QUALITY TITANIUM DIOXIDE.—Fides Ges. Fur Die Verwaltung Und Verwertung Von Gewerblichen Schutzrechten. July 16, 1937. 516,999.

PRODUCTION OF FILMS, foils, filaments, or the like of regenerated cellulose.—Schlesische Zellwolle, A.-G. July 29, 1937. 517,047.

MANUFACTURE OF DERIVATIVES of the saturated and unsaturated cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. July 19, 1937. (Cognate Application, 21253/38. 517,078.

STABILISATION OF PLASTIC POLYMERS of halogenobutadienes.—E. I. du Pont de Nemours and Co. July 17, 1937. 517,125.

MANUFACTURE OF CYCLIC KETONES of the cyclopentanopolyhydrophenanthrene series.—Soc. of Chemical Industry in Basle. July 22, 1937. (Cognate Applications, 21405/38, 21406/38, and 21407/38.) 517,133.

PRODUCTION OF FORMAMIDE DERIVATIVES.—E. I. du Pont de Nemours and Co. July 22, 1937. 517,143.

PRODUCING SOLID PARAFFIN from carbon monoxide and hydrogen.—Studien-und Verwertungsges. July 30, 1937. 517,002.

STABILISING CELLULOSE ESTERS.—Afag Finanzierrungs, A.-G. July 31, 1937. 516,945.

Amended Specifications Published

DERIVATIVES OF CYCLOPENTANO-DIMETHYL-POLYHYDROPHENANTHRENE.—N. V. Organon. 500,767.

Weekly Prices of British Chemical Products

A STEADY trade is being put through in most sections of the general chemical market although activity is perhaps a little less pronounced than in recent times. Dealers report a fairly good export inquiry and some expansion in the demand from overseas is expected. Items such as muriate of potash and nitrate of soda are in good request and rather more attention is being given to fertilisers generally. Lithopone and bichromates are in short supply and available parcels of imported material are commanding prices substantially higher than the home makers' quotations. So far as the price position is concerned chromic acid has advanced to 1s. per lb. but elsewhere values remain steady with a firm undertone. Business in the market for coal tar products has been on the quiet side during the past week and on the whole quotations remain unaltered at recent levels. Supplies of carbolic acid crystals are still insufficient to meet the spot demand.

MANCHESTER.—So far as deliveries into consumption against contracts are concerned conditions on the Manchester chemical market are now pretty well back to normal and substantial aggregate quantities are being taken up. New bookings here during the past week have been on a moderate scale, with sellers generally in view of the uncertain outlook as regards prices by no means anxious to commit themselves too far ahead. There is a good demand for a wide range of textile chemicals from Lancashire and Yorkshire users, whilst fair quantities are being taken up by paper makers and other of the leading consuming industries. In the tar products section prices are well held throughout the range and there is a steady demand for carbolic acid and several other materials.

GLASGOW.—A steady volume of business continues to be transacted in the Scottish heavy chemical market. Prices in almost all commodities remain very firm but shortages are still being experienced in waxes, Epsom salts and oxalic acid. Deliveries are still held up owing to recent transport difficulties.

Price Changes

Rises: Chrometan Crystals, Chromic Acid, *o*-Cresol, *p*-Cresol.

* In the case of certain products, here marked with an asterisk, the market is nominal, and the last ascertainable prices have been included.

General Chemicals

ACETIC ACID.—Maximum prices per ton: 80% technical, 1 ton, £34 15s.; 10 cwt./1 ton, £35 15s.; 4/10 cwt., £36 15s.; 80% pure, 1 ton, £36 15s.; 10 cwt./1 ton, £37 15s.; 4/10 cwt., £38 15s.; commercial glacial, 1 ton, £44; 10 cwt./1 ton, £45; 4/10 cwt., £46; delivered buyers' premises in returnable barrels. £4 per ton extra if packed and delivered in glass.

ACETONE.—Maximum prices per ton, 50 tons and over, £49 10s.; 10/50 tons, £50; 5/10 tons, £50 10s.; 1/5 tons, £51; single drums, £52, delivered buyers' premises in returnable drums or other containers having a capacity of not less than 45 gallons each; delivered in containers of less than 45 gallons but not less than 10 gallons £10 10s. per ton in excess of maximum prices; delivered in containers less than 10 gallons each £10 10s. per ton in excess of maximum prices, plus a reasonable allowance.

*ALUM.—Loose lump, £8 7s. 6d. per ton d/d.

*ALUMINIUM SULPHATE.—£7 5s. 0d. per ton d/d Lancs.

AMMONIA, ANHYDROUS.—99.95%, 1s. to 2s. per lb. according to quantity in loaned cylinders, carriage paid; less for important contracts.

AMMONIUM CARBONATE.—£20 per ton d/d in 5 cwt. casks.

AMMONIUM CHLORIDE.—Grey galvanising, £18 per ton, in casks, ex wharf. See also Salammoniac.

*ANTIMONY OXIDE.—£68 per ton.

ARSENIC.—99/100%, about £25 per ton, ex store

BARIUM CHLORIDE.—98/100%, prime white crystals, £11 10s. 0d. to £13 0s. 0d. per ton when available, bag packing, ex works; imported material would be dearer.

BLEACHING POWDER.—Spot, 35/37% £9 5s. per ton in casks, special terms for contract.

BORAX, COMMERCIAL.—Granulated, £20 10s. per ton; crystal, £21 10s.; powdered, £22; extra finely powdered, £23; B.P. crystals, £29 10s.; powdered, £30; extra fine £31 per ton for ton lots in free 1-cwt. bags, carriage paid in Great Britain. Borax Glass, lump, £64; powder, £65; in tin-lined cases for home trade only, packages free, carriage paid in Great Britain.

BORIC ACID.—Commercial granulated, £34 10s. per ton; crystal, £35 10s.; powdered, £36 10s.; extra finely powdered, £38 10s.; large flakes, £47; B.P. crystals, £43 10s.; powdered, £44 10s.; extra fine powdered, £46 10s. per ton for ton lots, in free 1-cwt. bags, carriage paid in Great Britain.

CALCIUM BISULPHITE.—£7 10s. per ton f.o.r. London.

*CALCIUM CHLORIDE.—GLASGOW: 70/75% solid, £5 12s. 6d. per ton ex store.

CHARCOAL LUMP.—£10 to £12 per ton, ex wharf. Granulated £11 to £14 per ton according to grade and locality.

*CHLORINE, LIQUID.—£18 15s. per ton, seller's tank wagons, carriage paid to buyer's sidings; £19 5s. per ton, d/d in 16/17 cwt. drums (3-drum lots); £19 10s. per ton d/d in 10 cwt. drums (4-drum lots); 4½d. per lb. d/d station in single 70-lb. cylinders.

CHROMETAN.—Crystals, 4d. per lb.; liquor, £19 10s. per ton d/d station in drums. GLASGOW: Crystals 4d. per lb. in original barrels.

CHROMIC ACID.—1s. per lb., less 2½d.%; d/d U.K. GLASGOW: 1s. 0½d. per lb. for 1 cwt. lots.

CHROMIC OXIDE.—1s. 2d. per lb., d/d U.K.

CITRIC ACID.—1s. 2d. per lb. MANCHESTER: 1s. 3d.

*COPPER SULPHATE.—Nominal.

CREAM OF TARTAR.—100%, £6 2s. to £6 7s. per cwt., less 2½%. Makers' prices nominal, imported material about £170 per ton.

FORMALDEHYDE.—40% by volume, £23 5s. to £25 per ton, according to quantity, d/d in sellers' returnable casks.

FORMIC ACID.—85%, £44 10s. per ton for ton lots, carr. paid, carboys returnable; smaller parcels quoted at 46s. 6d. to 49s. 6d. per cwt., ex store.

GLYCERINE.—Chemically pure, double distilled, 1,260 s.g., in tins, £3 10s. to £4 10s. per cwt. according to quantity; in drums, £3 2s. 6d. to £3 16s. 0d. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

HEXAMINE.—Technical grade for commercial purposes, 1s. 4d. per lb.; free-running crystals are quoted at 1s. 7d. per lb.; carriage paid for bulk lots.

HYDROCHLORIC ACID.—Spot, 5s. 6d. to 8s. carboy d/d according to purity, strength and locality.

IODINE.—Resublimed B.P., 9s. 2d. to 13s. per lb., according to quantity.

LACTIC ACID.—(Not less than ton lots). Dark tech., 50% by vol., £30 10s. per ton; 50% by weight, £35; 80% by weight, £60; pale tech., 50% by vol., £36; 50% by weight, £42; 80% by weight, £67. One ton lots ex works; barrels returnable.

LEAD ACETATE.—White, £48 to £50, ton lots.

LEAD NITRATE.—About £40 per ton in casks.

LEAD, RED.—English, 5/10 cwt., £41 10s.; 10 cwt. to 1 ton, £41 5s.; 1/2 tons, £41; 2/5 tons, £40 10s.; 5/20 tons, £40; 20/100 tons, £39 10s.; over 100 tons, £39 per ton, less 2½ per cent., carriage paid; non-setting red lead, 10s. per ton dearer in each case; Continental material, £1 per ton cheaper.

LEAD, WHITE.—Dry English, less than 5 tons, £51; 5/15 tons, £47; 15/25 tons, £46 10s.; 25/50 tons, £46; 50/200 tons, £45 10s. per ton, less 5% carriage paid; Continental material, £1 per ton cheaper. Ground in oil, English, 1/5 cwt., £59 10s. 5/10 cwt., £58 10s.; 10 cwt. to 1 ton, £58; 1/2 tons, £56 10s.; 2/5 tons, £55 10s.; 5/10 tons, £53 10s.; 10/15 tons, £52 10s.; 15/25 tons, £52; 25/50 tons, £51 10s.; 50/100 tons, £51 per ton, less 5% carriage paid. Continental material £2 per ton cheaper.

LITHARGE.—10 cwt.-1 ton, £34 15s. per ton.

MAGNESITE.—Calcined, in bags, ex works, about £9 to £10 per ton.

MAGNESIUM CHLORIDE.—Solid (ex wharf), £10 per ton.

*MAGNESIUM SULPHATE.—Commercial, £5 10s. per ton, ex wharf

MERCURY PRODUCTS.—Controlled prices for 1 cwt. quantities: Bichloride powder, 9s. 1d.; bichloride lump, 9s. 8d.; bichloride ammon. powder, 10s. 7d.; bichloride ammon. lump, 10s. 5d.; mercurous chloride, 10s. 11d.; mercury oxide, red cryst., B.P., 12s. 3d.; red levig. B.P., 11s. 9d.; yellow levig. B.P., 11s. 7d.

*METHYLATED SPIRIT.—61 O.P. industrial, 1s. 5d. to 2s. per gal.; pyridinised industrial, 1s. 7d. to 2s. 2d.; mineralised, 2s. 6d. to 3s. Spirit 64 O.P. is 1d. more in all cases and the range of prices is according to quantities.

*NITRIC ACID.—Spot, £25 to £30 per ton, according to strength, quantity and destination.

OXALIC ACID.—£59 5s. per ton for ton lots, carriage paid, in 5-cwt. casks; smaller parcels, 59s. 9d. to 60s. per cwt., ex store; deliveries slow.

*PARAFFIN WAX.—GLASGOW: 3¾d. per lb.

POTASH, CAUSTIC.—Liquid, £25 to £30 per ton, according to quantity.

POTASSIUM BICHROMATE.—5¾d. per lb. carriage paid. GLASGOW: 5¾d. per lb., carriage paid.

POTASSIUM CHLORATE.—Imported powder and crystals, ex store London, 10d. to 1s. per lb.

POTASSIUM IODIDE.—B.P., 8s. to 11s. 2d. per lb., according to quantity.

POTASSIUM NITRATE.—Small granular crystals, £26 to £29 per ton ex store, according to quantity.

POTASSIUM PERMANGANATE.—B.P. 1s. 3½d. per lb.; commercial, 143s. per cwt., d/d.
POTASSIUM PRUSSIATE.—Yellow, about 1s. 8d. per lb., supplies scarce.
SALAMMONIAC.—Dog-tooth crystals, £42 per ton; medium, £38; fine white crystals, £16; in casks, ex store.
SALT CAKE.—Unground, spot, £3 15s. per ton.
SODA ASH.—Light 98/100%, £5 17s. 6d. per ton f.o.r. in bags.
SODA, CAUSTIC.—Solid, 76/77° spot, £14 per ton d/d station.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE.—£25 to £26 per ton, ex wharf.
SODIUM BICARBONATE.—About £10 10s. to £11 10s. per ton, in bags.
SODIUM BICHROMATE.—Crystals, 4¾d. per lb., net d/d U.K. with rebates for contracts. GLASGOW: 5¾d. per lb., carriage paid.
SODIUM BISULPHITE POWDER.—60/62%. £12 10s. to £14 per ton d/d in 2-ton lots for home trade.
SODIUM CARBONATE MONOHYDRATE.—£20 per ton d/d in minimum ton lots in 2 cwt free bags.
SODIUM CHLORATE.—£27 10s. to £32 per ton, d/d according to quantity.
SODIUM HYPOSULPHITE.—Pea crystals, £16 17s. 6d. per ton for 2-ton lots; commercial, £13 10s. per ton. MANCHESTER: Commercial, £13; photographic, £16 10s.
SODIUM IODIDE.—B.P., for not less than 28 lb., 8s. 10d. per lb.; for not less than 7 lb., 10s. 9d. per lb.
*SODIUM METASILICATE.—£14 5s. per ton, d/d U.K. in cwt. bags.
SODIUM NITRATE.—Refined, £8 5s. per ton for 6-ton lots d/d.
SODIUM NITRITE.—£18 15s. per ton for ton lots.
SODIUM PERBORATE.—10%, £4 per cwt. d/d in 1-cwt. drums.
SODIUM PHOSPHATE.—Di-sodium, £16 to £17 per ton delivered for ton lots. Tri-sodium, £18 per ton delivered per ton lots.
SODIUM PRUSSIATE.—4¼d. to 5¼d. per lb.
SODIUM SILICATE.—£8 2s. 6d. per ton.
*SODIUM SULPHATE (GLAUBER SALTS).—£3 per ton d/d.
SODIUM SULPHATE (SALT CAKE).—Unground spot, £3 to £3 10s. per ton d/d station in bulk. MANCHESTER: £4.
SODIUM SULPHIDE.—Solid 60/62%, Spot, £11 15s. per ton d/d in drums; crystals, 30/32%, £9 per ton d/d in casks. MANCHESTER: Concentrated solid, 60/62%, £13; crystals, £9 15s.
*SODIUM SULPHITE.—Pea crystals, spot, £14 10s. per ton d/d station in kegs.
*SULPHUR PRECIP.—B.P., £55 to £60 per ton according to quantity. Commercial, £50 to £55.
SULPHURIC ACID.—168° Tw., £4 11s. to £5 1s. per ton; 140° Tw., arsenic-free, £3 to £3 10s.; 140° Tw., arsenious, £2 10s.
TARTARIC ACID.—1s. 5½d. per lb., less 5%, carriage paid for lots of 5 cwt. and upwards. Makers' prices nominal; imported material 2s. 3d. to 2s. 6d. per lb., ex wharf. MANCHESTER: 1s. 5¾d. per lb.
ZINC OXIDE.—Maximum prices: White seal, £30 17s. 6d. per ton; red seal, £28 7s. 6d. d/d; green seal, £29 17s. 6d. d/d buyers' premises.
ZINC SULPHATE.—Tech., about £19 10s., carriage paid, casks free.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 9½d. to 1s. 6d. per lb., according to quality. Crimson, 1s. 7½d. to 1s. 10½d. per lb.
ARSENIC SULPHIDE.—Yellow, 1s. 6d. to 1s. 8d. per lb.
BARYTES.—Imported material £6 to £9 per ton according to quality.
CARBON BLACK.—About 7d. to 7¼d. per lb., according to quantity.
CARBON DISULPHIDE.—£29 to £34 per ton, according to quantity, in free returnable drums.
CARBON TETRACHLORIDE.—£48 to £53 per ton, according to quantity, drums extra.
INDIA-RUBBER SUBSTITUTES.—White, 5¾d. to 6¾d. per lb.; dark 5½d. to 6d. per lb.
LAMP BLACK.—Imported material is quoted at about £35 to £40 per ton.
LITHOPONE.—30%, £18 17s. 6d. per ton; 60%, £31 to £32 per ton. Imported material would be dearer.
SULPHUR.—Finely powdered, about £15 per ton, delivered.
SULPHUR CHLORIDE.—6d. to 8d. per lb., according to quantity.
VEGETABLE BLACK.—£35 per ton upwards; 28/30%, £15 10s. 0d.; 60%, £29, delivered buyers' premises.
VERMILION.—Pale or deep, 8s. 5d. per lb., for 7 lb. lots.
ZINC SULPHIDE.—About £63 per ton ex works.

Plus 5% War Charge.

Nitrogen Fertilisers

AMMONIUM SULPHATE.—Per ton in 6-ton lots d/d farmer's nearest station up to January 31, 1940, £9; February, £9 3s.; March/June, £9 6s.
CALCIUM CYANAMIDE.—£12 10s. for 5-ton lots per ton net f.o.r. or ex store, London. Supplies small.
"NITRO-CHALK."—£8 18s. per ton, in 6-ton lots, d/d farmer's nearest station, January/June delivery.
CONCENTRATED COMPLETE FERTILISERS.—£11 18s. to £12 4s. per ton in 6-ton lots, d/d farmer's nearest station.
AMMONIUM PHOSPHATE FERTILISERS.—£11 14s. to £16 6s. per ton in 6-ton lots, d/d farmer's nearest station.

Coal Tar Products

BENZOL.—Industrial (containing less than 2% of toluol), 2s. to 2s. 1d. per gal., ex works, nominal.
CARBOLIC ACID.—Crystals, 9d. to 11d. per lb.; Crude, 60's, 3s. 3d. to 3s. 6d., according to specification. MANCHESTER: Crystals, 10d. to 11d. per lb., d/d; crude, 3s. 7d. to 3s. 10d.; naked, at works.
CREOSOTE.—Home trade, 5d. per gal., f.o.r., makers' works; exports 6d. to 6¼d. per gal., according to grade. MANCHESTER: 4¾d. to 6¾d.
CRESYLIC ACID.—99/100%, 2s. 11d. to 3s. 3d. per gal., according to specification. MANCHESTER: Pale, 99/100%, 3s.
NAPHTHA.—Solvent, 90/160°, 1s. 8d. to 1s. 9d. per gal; solvent, 95/60°, 1s. 11d. to 2s., naked at works; heavy, 90/190°, 1s. 3d. to 1s. 5d. per gal., naked at works, according to quantity. MANCHESTER: 90/160°, 1s. 6½d. to 1s. 9d. per gal.
NAPHTHALENE.—Crude, whizzed or hot pressed, £10 to £11 per ton; purified crystals, £16 per ton in 2-cwt. bags. LONDON: Fire lighter quality, £3 to £4 10s. per ton. MANCHESTER: Refined, £17 to £18.
PITCH.—Medium, soft, 35s. per ton, f.o.b. MANCHESTER: 37s. 6d., f.o.b. East Coast.
PYRIDINE.—90/140°, 19s. to 20s. per gal.; 90/160°, 16s. to 18s. 6d.; 90/180°, 3s. 9d. to 4s. 6d. per gal., f.o.b. MANCHESTER: 17s. to 19s. 6d. per gal.
TOLUOL.—90%, 2s. 3d. per gal.; pure, 2s. 5d., nominal. MANCHESTER: Pure, 2s. 5d. per gal., naked.
XYLOL.—Commercial, 2s. 7d. per gal.; pure, 2s. 9d. MANCHESTER: 2s. 9d. per gal.

Wood Distillation Products

CALCIUM ACETATE.—Brown, £7 5s. to £8 per ton; grey, £10 to £12. MANCHESTER: Grey, £14.
METHYL ACETONE.—40.50%, £35 to £38 per ton.
WOOD CREOSOTE.—Unrefined, 1s. to 1s. 3d. per gal., according to boiling range.
WOOD NAPHTHA, MISCIBLE.—3s. 7d. to 4s. per gal.; solvent, 4s. to 4s. 6d. per gal.
WOOD TAR.—£4 to £5 per ton, according to quality.

Intermediates and Dyes

ANILINE OIL.—Spot, 8d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—1s. 10d. per lb., for cwt. lots, net packages.
BENZIDINE, HCl.—2s. 7d. per lb., 100% as base, in casks.
BENZOIC ACID, 1914 B.P (ex toluol).—1s. 11d. per lb. d/d buyer's works.
m-CRESOL 98/100%.—1s. 8d. to 1s. 9d. per lb. in ton lots.
o-CRESOL 30/31° C.—8d. to 9d. per lb. in 1-ton lots.
p-CRESOL 34/35° C.—1s. 8d. to 1s. 9d. per lb. in ton lots.
DICHLORANILINE.—2s. 1½d. to 2s. 7d. per lb.
DIMETHYLANILINE.—Spot, 1s. 7½d. per lb., package extra.
DINITROBENZENE.—8d. per lb.
DINITROCHLORBENZENE, SOLID.—£79 5s. per ton.
DINITROTOLUENE.—48/50° C., 9d. per lb.; 66/68° C., 11½d.
DIPHENYLAMINE.—Spot, 2s. 3d. per lb.; d/d buyer's works.
GAMMA ACID, Spot, 4s. 4½d. per lb 100%, d/d buyer's works.
H ACID.—Spot, 2s. 7d. per lb.; 100%, d/d buyer's works.
NAPHTHIONIC ACID.—1s. 10d. per lb.
β-NAPHTHOL.—£97 per ton; flake, £94 8s. per ton.
α-NAPHTHYLAMINE.—Lumps, 1s. 1d. per lb.
β-NAPHTHYLAMINE.—Spot 3s. per lb.; d/d buyer's works.
NEVILLE AND WINTHER'S ACID.—Spot, 3s. 3½d. per lb. 100%
o-NITRANILINE.—4s. 3½d. per lb.
m-NITRANILINE.—Spot, 2s. 10d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 10d. to 2s. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 4½d. to 5½d. per lb., in 90-gal. drums, drums extra, 1-ton lots d/d buyer's works.
NITRONAPHTHALENE.—10d. per lb.; P.G., 1s. 0½d. per lb.
SODIUM NAPHTHIONATE.—Spot, 1s. 11d. per lb.; 100% d/d buyer's works.
SULPHANILIC ACID.—Spot, 8¾d. per lb. 100%, d/d buyer's works.
o-TOLUIDINE.—11d. per lb., in 8/10 cwt. drums, drums extra.
p-TOLUIDINE.—2s. per lb., in casks.
m-XYLIDINE ACETATE.—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON.—February 12.—For the period ending March 2, per ton, net, naked, ex mill, works or refinery, and subject to additional charges according to package and location of supplies:—LINSEED OIL, raw, £46 5s. RAPESEED OIL, crude, £44 5s. COTTONSEED OIL, crude, £31 2s. 6d.; washed, £34 5s.; refined edible, £35 12s. 6d.; refined deodorised, £36 10s. SOYA BEAN OIL, crude, £33; refined deodorised, £37. COCONUT OIL, crude, £28 2s. 6d.; refined deodorised, £31 7s. 6d. PALM KERNEL OIL, crude, £27 10s.; refined deodorised, £30 15s. PALM OIL, refined deodorised, £33. GROUNDNUT OIL, crude, £35 10s.; refined deodorised, £40. WHALE OIL, crude hardened, 42 deg., £30 10s.; refined hardened, 42 deg., £33. ACID OILS.—Groundnut, £24; soya, £22; coconut and palm kernel, £22 10s. ROSIN, 25s. to 35s. per cwt., ex wharf, according to grade. TURPENTINE, 54s. 9d. per cwt., spot, American, including tax, ex wharf, barrels, and ex discount.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

CASSIE & CO., LTD., London, E.C., chemists. (M., 17/2/40.) Feb. 2, mortgage, to Midland Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 121 Newgate Street, E.C., etc. *Nil. Mar. 7, 1938.

DECORWALL, LTD., Birmingham, paint manufacturers. (M., 17/2/40.) Jan. 31, charge, to Westminster Bank, Ltd., securing all moneys due or to become due to the Bank; charged on 1 Cheapside, Birmingham, etc. *——. Nov. 8, 1939.

NATIONAL COKE & OIL CO., LTD., London, E.C. (M., 17/2/40.) Feb. 7, by order on terms, charge, to Royal Bank of Scotland, securing all moneys due and owing to the Bank not otherwise secured; charged on property at Princes End, Tipton. *£2,750. Nov. 24, 1938.

Satisfactions

J. FERRER, LTD., London, E.C., chemical manufacturers (M.S., 17/2/40.) Satisfaction Feb. 3, £300, registered Aug. 2, 1939.

County Court Judgments

MILFORD PRODUCTS CO., LTD. R.O., Forge Mill, Milford, manufacturing chemists. (C.C. 17/2/40.) £25 1s. 6d. January 6.

PHARMAGLAN LABORATORIES, LTD., 7 Princess Street, Hanover Square, W.1., manufacturing chemists. (C.C. 17/2/40.) £21 9s. 11d. January 4.

PHŒNIX PROPRIETORIES, LTD, R.O. Imperial Works, Ryland Road, N.W., manufacturing chemists. (C.C. 17/2/40.) £18 5s. 0d. December 4.

Receiverships

LACCO PROPRIETORS, LTD. London, N.W., lacquer manufacturers and agents. (R. 17/2/40.) J. C. Sherrott, 22 Basinghall Street, E.C. February 1.

LINTENITE PRODUCTS, LTD., London, W.C., whiting lime burners, etc.—S. G. S. Bringworth, 53 Great Marlborough Street, W.1. February 2.

New Companies Registered

Craingold and Co., Ltd. (359,296).—Private company. Capital £750 in 750 shares of £1 each. To carry on the business of manufacturers of and dealers in chemicals, gas, drugs, medicines, plasters, disinfectants, fertilisers, salts, acids, foodstuffs, oils, isinglass, colours, glues, gums, pigments and varnishes; opticians, manufacturers of and dealers in optical and other instruments, etc. Permanent directors: Maurice Craingold and Gertrude Craingold. Solicitor: Cecil Servian, 71 Westgate Road, Newcastle-on-Tyne. Registered office: 146 Cheetham Hill Road, Manchester.

F. and M. Supplies, Ltd. (359,244).—Private company. Capital £1,000 in 1,000 shares of £1 each. To carry on the business of manufacturers, sellers and distributors of and dealers in oils, pastes and powders for foundries and metallurgical industries; ironmasters, ironfounders, mechanical engineers, etc. Directors: Gilbert Millard, Donald D. R. Watson. Solicitors: Woodroffes and Gibbs, 20 Eastcheap, E.C.3. Registered office: 21/3 Coldharbour, Poplar, E.14.

Rostone, Ltd. (359,190).—Private company. Capital £100 in 100 shares of £1 each. To carry on business as consultants, advisers, installers, licencees, licensors and concessionaires in everything appertaining to processes, inventions and methods for the refining, distillation, abstraction or treatment of oils, waxes, mineral and substances of all kinds, manufacturers of chemicals, chemists' sundries, etc. Subscribers: Lionel Morrish, Dorothy L. Champion. Secretary: Lionel Morrish. Registered office: 4 Cullum Street, Fenchurch Street, E.C.3.

Company News

Borax Consolidated, Ltd., have announced that net profits in the year to September 30 last rose from £405,284 to £425,644. The dividend on the preferred shares is maintained at 6 per cent., with a final of 3 per cent. Deferred stock again receives 7½ per cent.

Bradford Dyers' earned a profit of £233,556 after charging £142,625 for depreciation. After deducting debenture interest of £46,186, there is a balance of £187,370, and this converts the debit of £137,227 from the previous year into a credit of £50,143.

An interim report by **Low Temperature Carbonisation** states that the position and prospects of the company were never better and that the last few months have witnessed a satisfactory measure of all-round progress.

Chemical Trade Inquiries

Australia.—H.M. Senior Trade Commissioner in Australia reports that the Posts and Telegraphs Department, Melbourne, is calling for tenders (Schedule No. C. 2685) for the supply and delivery of quantities of zinc, ammonium chloride and sac elements required for primary batteries. Tenders, endorsed "Tenders for Primary Battery Material, Schedule C. 2685," should be addressed to the Deputy Director, Posts and Telegraphs, Melbourne, C.1, Australia, by whom they will be received up to 3 p.m. on Tuesday, March 12, 1940. (Ref. T. 15274/40.)

Chemical and Allied Stocks and Shares

BUSINESS in the stock and share markets has been slightly more active this week, but apart from Railway securities, movements in values were small, although mostly in favour of holders. Shares of companies associated with the chemical and kindred trades were rather more active in sympathy with the general trend.

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Imperial Chemical, which continued to be influenced by market hopes that the dividend may be kept on an 8 per cent. basis, have moved up from 30s. 6d. to 31s. 3d., but the preference units at 32s. 3d. lost part of their recent advance. B. Laporte held their recent gain, and were quoted around 60s. 9d. "middle," while Borax Consolidated deferred were firm at the higher price of 25s. 6d., the maintenance of the dividend at 7½ per cent. being regarded as a good achievement. United Molasses at 25s 6d. had a steady appearance, awaiting the results for the past financial period, but the ordinary units of the Distillers Co. were less firm at 67s. 3d. which compares with 68s. a week ago. Lever & Unilever ordinary at 29s. 3d. were unchanged on balance, but the 7 per cent. preference went back 6d. to 29s. and the 8 per cent. preference 4½d. to 28s. 3d. Monsanto Chemicals 5½ per cent. preference were again quoted at 21s. 3d. Nairn & Greenwich kept at 55s., while Barry & Staines at 31s. were again higher on balance.

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Associated Cement were again out of favour, awaiting the preliminary figures for the past year's working, expected early next month, but British Plaster Board had a steadier appearance. Dunlop Rubber fluctuated on uncertainty whether the distribution for the past year will be maintained, but on balance the price has improved, dealings having taken place around 31s. British Aluminium had an easier appearance at 50s. and British Oxygen were 70s., while Turner & Newall were slightly lower at 63s. 6d. Triplex Glass were maintained at 18s. 6d. and United Glass Bottle ordinary shares remained tightly held, awaiting the forthcoming dividend announcement. Cerebos and Reckitt & Sons ordinary shares moved in favour of holders, and International Nickel were little changed on the week. The annual report of the last-named company falls to be issued next month. British Oil & Cake Mills preferred were fairly steady around 39s.

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Iron and steel securities showed moderate gains. Baldwins 4s. ordinary were around 6s. 3d. pending the dividend announcement, expected in a few weeks. Richard Thomas preference were steady at 15s. 9d. aided by market hopes that dividends may be resumed in April. Dormon Long transferred around 27s. 6d. and Ruston & Hornsby were active at the higher levels of 30s. 3d. under the influence of the acquisition recently announced by the company. Tube Investments at 93s. have moved in favour of holders, but Wall Paper Manufacturers deferred were lower at 15s. 3d. British Glues remained firm at 6s. 6d. and British Drug Houses held their recent rise to 25s. Pinchin Johnson moved up to 20s. 6d., which compares with 19s. 3d. a week ago, while International Paint improved from 73s. 9d. to 75s. Valor ordinary reacted slightly from 27s. to 26s. 3d.

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Boots Drug rose sharply to 42s. 6d. while Timothy Whites were higher at 25s. Under existing conditions, the fact that the last-named company has a large number of stores in country districts is regarded as a good factor, and current market hopes are that the dividend may at least be maintained. Sangers were around 21s. Oil shares again moved against holders, including "Shell" and Anglo-Iranian.